

## FIRE

coated with a mixture of antimony sulfide and potassium chlorate that was held on the wooden matchstick by gum arabic and starch. When this tip was rubbed on a rough surface, friction produced enough heat to ignite the chemicals. The burning chemicals then produced enough heat to ignite the matchstick. More efficient matches were developed later. See MATCH (History).

### What Fire Produces

An entire piece of wood or coal will not burn, even if there is sufficient oxygen present. Most of us have taken the ashes from a charcoal grill or fireplace. The ash, generally a mixture of minerals, is present in the fuel, but will not unite with the oxygen. Some fuels have a lower ash content than others. This is important to remember when buying charcoal or wood because you want the fuel with the lowest ash content, provided that it is good in other respects.

Often the bottom of a pan or a skillet becomes black when it is placed over a fire. This is because of the unburned carbon, and soot. Soot forms when there is not enough oxygen present to burn all the carbon of the fuel. If a furnace produces great quantities of soot, some of the carbon of the fuel is not being burned, and is wasted. This can be remedied by seeing that sufficient air is supplied to burn all the carbon in the fuel.

**Gases.** Substances that burn in air are nearly always composed of two elements, carbon and hydrogen, or their compounds. For example, coal, coke, and charcoal are mostly carbon. Natural gas, gasoline, and fuel oils consist of many compounds of hydrogen and carbon. When these fuels burn, the oxygen of the air unites with the carbon and hydrogen to form carbon dioxide gas and water vapor. These usually mix with the air and disappear. The uniting of the oxygen with the hydrogen and the carbon is what produces the heat and flame of the fire.

Often, a deadly gas called carbon monoxide forms when there is not enough oxygen to burn the fuel completely. For example, when gasoline burns in an automobile engine, some of this gas forms and comes out the exhaust pipe. If you are in a closed garage when this happens, you are in danger of breathing this gas. Death may result. A person should never run the engine of an automobile in a closed garage.

Smoke, like soot, is produced when too much fuel is added for the amount of oxygen present. It is unburned carbon going out the chimney. Smoking furnaces are wasteful because all the fuel is not burned and the heat energy is lost. The smoke is also a nuisance, because it makes a neighborhood dirty.

**Light.** Most of the energy caused by a fire goes into heat, but some of it goes into light. The light results either because the carbon particles in the flame become so hot that they give off light energy, or because the gas that is burning is a type that gives off light.

Ever since fire was discovered, people have been trying to make more energy from heat go into light energy. People first used flaming pieces of wood as torches. They later discovered that if the wood was dipped into pitch before lighting it, the light lasted longer and was much brighter. Years afterward, people poured oil in a dish, placed a wick in it, and lighted the wick. This gave a

better light. Later, the tallow candle, which was convenient to carry around, was invented. The kerosene lamp, with its chimney to help control the air currents, was a big improvement over the candle. After electricity was made usable, Thomas A. Edison sent an electric current through a carbon *filament* (wire) until the filament became so hot that it gave off light.

### Fire in Legend and Religion

We can only guess that prehistoric people may have gained a knowledge of fire from observing things in nature, such as lightning, the fire of volcanoes, and the heat of the sun. They also must have noticed that sparks fly when stones are struck upon one another, or when the hoofs or claws of an animal strike some hard substance. In Persian literature, there is a story of the discovery of fire in a fight with a dragon. One of the stones which the hero used as weapons missed the monster and struck a rock. Light shone forth and human beings saw fire for the first time. The mythology of nearly all early peoples contains some account of accidental or supernatural happenings which first revealed fire to human beings. Fire was regarded as a true gift of the gods.

Fire was considered sacred because it was so essential to the welfare of people. Fire worship and sun worship have existed since very early times. Because fire was so hard to produce, the custom soon became common of keeping a public fire, which was never allowed to die out. These fires were kept in every village among the Egyptians, Persians, Greeks, and Romans. They were often in the civic center of the community.

The Temple of Vesta in Rome was an outstanding example of the importance of fire to the Romans. Vesta was originally the goddess of the hearth, and her shrine was in every home. But when religion became an affair of state, a temple was erected in which the sacred fire was kept constantly burning. This temple consisted merely of a round hearth. For its service, there were selected the Vestal Virgins, who devoted their lives to the duty of attending the fire. They were selected by the high priest, or pontifex maximus, and the safety of the state was thought to depend upon the faithfulness of the Vestal Virgins.

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**FIRE ALARM.** See FIRE DEPARTMENT.

**FIRE ANT.** See ANT (The Importance of Ants).

**FIRE BLIGHT.** See PEAR (Diseases); BLIGHT.

**FIRE CLAY.** See CLAY.

**FIRE CONTROL** is the aiming and firing of guns, rockets, torpedoes, and other weapons at targets. Fire-control equipment includes all devices used in calculating and adjusting fire. Aiming a gun tube or rocket launcher is the simplest form of fire control. More complicated systems guide rockets or missiles after launching. This guidance may be in the form of a device built into the missile. Guidance may also be provided from the launching site through the use of radar beams or attached wires.

HUGH M. COLE

See also GUIDED MISSILE; GYROSCOPE; RADAR (In the Military); RANGE FINDER.